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Socio-Economic Implication of Various types of Forest Management in Gazipur District Bangladesh

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Abstract: *'Sal (Shores robusta)' forest is the only plain land forest in Bangladesh which has been exploited to an environmentally threatening extent over the last couple of decades. The Forest Department undertook a reforestation program in association with a number of NGOs and rehabilitated many people in the encroached area(Choudhury, 2011). Participants were given encroached forest land for reforestation along with other necessary support such as high quality seedlings, training and financial support. Protecting the newly replanted forest was an initial and particular concern for the Forest Department as theft and illicit logging was one of the major problems causing exploitation. The Forest Department assumed that proper protection would minimize over-exploitation of the newly planted forest as well as the existing forest(Raj, Karma, & Temphel, 2015). The Forest Department also hypothesized that the demographic attributes of the stakeholders may affect the protection activities. This study focuses on how reforestation affects sustainability issues along with as well as identifying the variables that affect protection activities. The study sample size comprised of 274 households, which were selected using a simple random sampling method. Analysis of the forest protection aspects was performed using two discrete dependent variable based models (Logit and Probit)(Government of the People's Republic of Bangladesh, 2016). This study compares these two models in order to better identify the variables affecting the intention of protection by the stakeholders. Socio-economic attributes were examined using non-parametric statistics with respect to an income factor. The decision to implement protection is affected by the age, family size, and degree of education.*

Key Words: *Forest Management, Gazipur District, destruction, Socio-Economic Implication.*

1. INTRODUCTION:

Sal occurs gregariously on the southern slopes of the Himalayas and is distributed in Bangladesh, India and Nepal. Its presence is also indicated in Bhutan and South China. It is evident that Sal forests are potential to yield other forest products too(Biswas & Choudhury, 2007). Besides, associates of Sal are known to produce edible fruits, fodder and compost, fibers, leaves for umbrellas, medicinal plants, thatch, grass, brooms and many other products depending on the species composition. In Bangladesh, the Sal forests are one of the three major forest resources (other types are tropical evergreen and coastal forests) covering about 32% of the total forestland and 10% forest coverage(Center for Policy Dialogue, 2002).The total area of Sal forests is 110 thousand hectares in Bangladesh, out of which 86% is in the central region and 14% in northern region. The Sal forest in the central region is known as 'Madhupur Garh', which is comprised of two National Parks: Madhupur and Bhawal National Park. Sal forests are scattered in the central and northern parts of Bangladesh, and the major forest lies in the districts of Gazipur, Mymensingh and Tangail. Madhupur National Park is situated in the district of Mymensingh and Tangail(BFD, 2017). The Bhawal National Park is located in the district of Gazipur and considered as suburbs of the highly populated mega city; Dhaka (the capital of Bangladesh). These forests have a high economic and ecological significance in the central part of Bangladesh. Sal forests have also ethnic and cultural values in Bangladesh as few ethnic communities (tribal people) live in these forests, and their livelihood and culture is directly related to these forests(Ali, Abul, & Miah, 2008). Photo geographically both the parks belong to same agro-ecological zone and classified under tropical moist deciduous forests. *Shorea robusta* is the dominant species of these forests and usually forms 75% to 25% of the upper canopy in the natural habitat("Bangladesh National Action Programme (NAP) for Combating Desertification National Action Programme (NAP) for Combating Desertification in Bangladesh," 2005) .

2. OBJECTIVES OF THE STUDY:

At the backdrop of such an apocalyptic situation for Bangladesh, the main objectives of this paper are to-

- Examine the knowledge regarding various Kinds of forest management in Gazipur district.

- To explore socio economic implication of various types of forest management.
- To assume relationship between various socioeconomic variables and forest management.
- To explore mainly the existing conditions and forest management problems of participatory forestry in Bangladesh.

3. Review of literature and theoretical framework

This study is about analyzing vulnerability of socio-economic implications of various types of forest management in Gazipur District. In analyzing the vulnerability of Sal community, socio- demographic factors; livelihood pattern; health risk perception; knowledge, personal attitude and beliefs on the myths and intensity of forest management; behavior related to health; coping strategies et would be explored and linked with health behavior using statistical as well as interpretive manner(Kubi, 2012). In this chapter an attempt will be taken to review both theoretical and empirical issues, which would help the researcher to understand underlying issues of dynamics of various types of forest management(Mohammed M. Rahman, Rahman, & Islam, 2010).

4. Theory of collective action:

The key issues that forest management can perhaps be described by looking at collective action aspects of human management of forestland. Collective action refers to concerted actions of people that share a common interest, perceive that interest and act to achieve it(Mohammed Mahabubur Rahman, Rahman, Guogang, & Islam, 2010). Collective action is an important mechanism for coordinating individual resource users towards achieving socially accepted outcomes by assigning management responsibilities that correspond with simple and complete ownership rights(M. Hossain, Rokanuzzaman, Rahman, Bodiuzzaman, & Miah, 2015). We can conceptualize the challenges of motivating collective action in JFM and common pool resource (CPR) management in general by analyzing the supply and demand side problems associated with a CPR. From the supply side, we face the general problem of ensuring efficient provision of (local) public good aspects of the forest among different users. On the demand side, we face two fundamental problems: Firstly, we face the problem of defining and assigning property rights to forest users(Choudhury, 2011). Heterogeneity of users, diversity of local preferences and the multiple goods and services forests provide make the assignment and enforcement of property rights particularly difficult and increasingly beyond the capacity of most traditional governance systems in South Asia(M. K. Hossain, 2016).

5. Sociological Perspective in Forest Management:

The destruction of forests began from the formation of early civilizations. The Laws of Manu (samhita) is replete with passages referring to the formation of human habitat by clearing the jungle. Thus began the antinomy between men and nature, which took a monstrous proportion in modernity(Razzaque, 2017). The 1839 writings of early Engels, Letters from Wuppertal, is a remarkable documentation of the ruthless destruction of environment by early industrialization and the misery that befell on modern mankind, especially the working class(Papers, 2008) . The unethical persuasion of profit by industrial capitalism has led to the global annihilation of forests, and the planet has experienced an unprecedented high rate of destruction of forests since. FAO made a global assessment of 179 countries in1990 and found that forest land constituted slightly over 3,400 million ha or 27 per cent of the land area. Forests of the developed regions represented 42 per cent of the total global forest area compared to 58 per cent of the underdeveloped regions (Baten, Khan, Ahammad, & Missbahuzzaman, 2010). The loss of forest area during 1980-90 was estimated to 163 million ha, of which 154 million ha or 94.5 per cent was in the tropics only . The per capita forest area fell globally from an average of nearly 1.2 ha in the 1960 to 0.6 ha in 1990 and it is projected to be less than 0.2 ha by 2020 . Thus, between 1960 and 1990, there was a steep rise in the decadal rate of deforestation worldwide with Brazil having the highest annual rate(Hasan, Deng, Li, & Chen, 2017).The global data show that the Atlantic coast of Brazil, the Philippines, Madagascar and Sumatra have lost between 85 per cent and 95 per cent of their forests due to ruthless corporate industrial exploitation, whereas heavy bombing has destroyed 70-85 per cent rainforest of El Salvador during the civil war in 1984-85 and of Afghanistan during the American invasion in the 1990s. Interestingly enough, 94 per cent of Central Africa's forests are not protected by law(Land & Forest, 2016).

6. Methodology of the Study:

This study is about the dynamics Socio- economic based solutions which accelerate successful adaptation of forest management system which will enhance the capacity of farmers, other natural resource users and policymakers to better manage land, the environment.

6.1. Data collection: Method of measurement

In social science various methods of data collection have different advantages and disadvantages and given this fact, it would seem to make sense for the sociological researchers to make use of a number of different

methods in their research since a weakness in one method could be avoided by using another method that is strong in the area that the first is weak(GOP, 2002). A combination of different methods would give us a much more rounded picture of the phenomenon being studied. Thus both qualitative and quantitative data collection methods were used in this study.The decision of using both qualitative and quantitative methods of data collection was because of their appropriateness for examining different facets of the phenomena under study, for triangulation of the data, and for adding breadth and depth to the examination of the issues studied.

6.2 Sampling Procedure:

Probability sampling approach was followed for conducting survey for the quantitative part of this study. Particularly systematic random sampling procedure was adopted to draw sample for the survey. As mentioned earlier, this study was conducted at union (administrative unit) and the unit of analysis was head of the household(Jashimuddin & Inoue, 2012). The total number of households under study area was about 6367 and all these households were considered as the sampling frame out of which the required number of sample was drawn. Accordingly, attempts were taken to identify the sampled households in the *words* with the help of local gatekeepers.

6.3 Data Collection Instruments:

Administering questionnaire survey requires a literate target population. Besides it often becomes problematic because participants may more likely to stop answering mid-way through the survey. Non-response rate is also high in questionnaire survey. Thus considering the drawbacks of using questionnaire, semi-structured interview schedule was used for conducting survey. To collect data this, study solely depended on survey. Details of data collection process are stated below. In addition, in line with the study design qualitative data was gathered. For the qualitative part of this study FGDs and case studies were conducted. For conducting FGDs and case studies a guideline and checklist were constructed containing questions related to the topic of this research respectively(Giessen, Sarker, & Rahman, 2016).

6.4 Sample of the study:

The unit of analysis was the participatory agro forestry program settler households. As a household can only participate in the program who are directly or indirectly involved in forest management program, all household studied can be classified as "Beneficiary" at the beginning of the project. To make the analysis easier, only households that completely rely on the participatory agro forestry program for their income were considered, as otherwise the direct influence of the participatory agro forestry program on settlers cannot be determined anymore.

6.5 Data analysis:

All the quantitative data collected from the primary and secondary sources was tabulated and entered into the MS-EXCEL software program. The three methods of poverty equations were calculated with the help of this MS-EXCEL program. Where the households have more than 1 US$ income had zero poverty gap. In order to test the socioeconomic model, the SPSS statistical software program was used. In SPSS, linear regression analysis with backward selection method (in this method the most insignificant variable was first deleted from the model and this process was continue until the significant variables were occurred) were conducted at 5% level of significance (alpha level) for getting statistical result to determine the important factor for socio economic conditions of participants for various types of forest management and the reason for income differences. In social science research 5% significance level is the most accepted approach which indicated that 5% chance the hypothesis being wrong if the null hypothesis should be rejected(Foysal, 2013).

6.7 Results of the Study

This chapter describes the empirical findings of the research. First of all, the outcomes as regards the reduction in poverty will be discussed. Secondly, the associated factors and constraints that might responsible for poverty will be discussed. The poverty analysis of this study showed that there was an income difference among the settlers. To find out what might explain the differences between the incomes of the settles, linear regression was carried out. In describing linear regression model the description of the studied variables with their individual effect on income variable will be discussed initially. Later on the total model and its backward selection procedure (first include all variables then removed one by one variables with their highest non-significant level and finally it consist of only significant variable at 5% alpha level) will be discussed. The backward procedure should only express the fitted variables which had significant effect to the income variable(Muhammad Abdullah, Golam Mahboob, Mezanur Rahman, & Ahmed, 2015).

7. Characteristics of the variables included in the socioeconomic model:

Per Capita Income (Dependent variable)

The mean income of the PAP households in 2009 was 80.01 Taka/day which indicates that on an average the households were living above to the predetermined poverty line for Bangladesh The standard deviation of the income was 24.62, this deviation was varying due to many correlated factors, of them studied variables were the most important (about 72%). Among the independent variables the family size, months of food sufficiency, institutional loan and distance to market was the most important factors that affect per capita income of the setter in this program. In the environmental economic series. income level of the forest dependents people depends on many socioeconomic parameters, on which family size, education level, and communications, are the important factors. Similar findings were observed in this study(Alam, 2009).

Table: Descriptive statistics of the studied variables

Variables	Unit of Measurement	Mean	Std. Deviation
Per Capita Income	Taka/Day	80.01	24.621
Average Family Size	Number	5.34	1.042
Average education	Category	1.35	0.733
Average Family Age	Years	28.51	4.36
Previous Income	Category	1.12	0.328
PAP Duration	Years	6.04	2.05
Months of Food Sufficiency	Months	3.62	1.259
Distance to Market	Kilometer	3.02	1.134
Agroforestry Training	Category	1.53	0.502
Institutional Loan	Category	1.14	0.350

NB. Per Capita Income is the dependent variable

Family size: The mean family size of the settlers in this study area was 5.34 which was higher than the national mean family size of 4.8 in Bangladesh . low illiteracy rate of the settlers. Salam (2005) said that a large family size is considered to the burden for Bangladesh; he also found in his research on 2005 that family size was the key factor for increasing the income levels of the households. The highest and lowest family size of this area was 3 and 8 accordingly, which indicted both the biggest and smallest family size. In the concept of PAP, the entire family members were treated as equally. Increases the number of family member significantly increases the income level and the shows the strong trends of these two variables. The Beat coefficient value of family size was 3.015 which was statistically significant at 5% level. Beta coefficient value should explain the strength of the family size over income variable. In case of individual effect of family size on the income of the settlers the result revealed that about 25% income differences explain by the family size itself. Therefore, the bigger the family size the bigger the income level in this study(Iftekhar, 2006).

Previous income: Under the policy of the Participatory Agroforestry Program all the settlers were living below the poverty line before starting the program, i.e. they all were treated as poor whether they have any previous income or not. Most of the settlers do not have any job/income sources and the average value of this variable was just 1.12 (1 is jobless 2 represent having job) that means some settlers had job but it was not enough to avoid their family poverty. Therefore, the previous income of the settlers had no significant effect on income at 5% level it was non-significant to this model. Table 5 also revealed that the settlers who had previous income were more educated and their income was higher than jobless family. Previous incomes of the settlers were positively correlated to their income variable of this program(Rashid, Craig, & Mukul, 2017).

PAP program duration: In the agreement of this program the settlers were allocated the land right for the period of ten (10) years only and this study considered the current year income of the settlers. The result showed that the average program duration of the settlers was 6.04 years which had non-significant effect to the income of the settlers at 5% level of significance. The average duration indicated that most of the settlers were quit experienced of agroforestry system production. While the more the duration the more the income of the settlers. Furthermore, the lowest and highest program duration of this study was 2 and 12 years (this study considered at least 1 year experience) and represents the changing trends of PAP duration and settlers income level.

Months of food sufficiency: To evaluate the food sufficiency of the settlers, this study introduced five categories.

The mean value of this variable was 3.62 which indicated that overall months of food sufficiency of the settlers was increasing rapidly compare to initial situation. According to the highest and lowest value of this variable, it was evident that some settlers were faced food shortage all most all the year round while some settlers had food sufficiency throughout whole year. Months of food sufficiency was statistically significant to the income of the setters and the individual effect of food sufficiency on income variable was very high (according to R square value) and the figure 8 clearly shows the strong positive relationship between income and months of food sufficiency variables.

Distance to market: The main and only market for the PAP settlers to sell their products was located at the Jalsatropur Bazar which situated at the two side of the Muktagasa - Modhupur highway of Bangladesh. To observe the whole study area and its overall road infrastructure this study made five categories to describe this variable. Most of the road communication systems were very poor and made with mud (wet clay soil) but the nearest PAP plot has got the facilities of Panka to half Panka (made with stone and bitumen) road for carrying the PAP products to the market. The result shows that mean distance to market value was 3.02 which indicated that the settler was facing moderate distance to reach the market (after 5 to 6 km from the market all the roads were made with mud). The distance to market variable was significant and negatively correlated to the income variables at 5% level of significance. The increasing of distance to the market the household per capita income should decrease significantly. In practically it was noticed that if the distance was far like 7 to 9 km from the market place it induced 1 to 1.5 Taka excess travelling cost per pineapple or 100 to 150 Taka per Van (1 Van contain 100 pineapple at a time) and the case was worse for those household situated more that 15 km far from the market place. Furthermore, PAP areas were situated very near to the market their income goes to over 100 Taka/day, while those who stand far away from the market should have lower income.

Agroforestry Training: The technology for growing tree and crop in the same pieces of land (i.e. Agroforestry, said by Nair, 1990) is new for the people of Bangladesh and the result of this study showed that the settler who had received agroforestry training should have increased their income level (figure 10) though it was statistically non-significant. Any sorts of agroforestry training might make the difference for utilization or cultivation technique of the PAP area efficiently. Some settlers utilized their land in maximum resources utilization techniques to practice multilayered cropping system with the training they have received from organizations. The total production of this multilayered production system reach to the pick compare to other production system. On the other hand, 49% settlers do not receive any training from any organizations.

Institutional loan: Micro credit facilities or getting loan from any institution is very helpful for the poor settlers to resolve their poverty in Bangladesh (Speech by Prof. Mohammed Yunus, Nobel laureate). The mean value of getting loan was only 1.14 indicated majority of the settlers do not have any loan facilities or under the umbrella of micro credit facilities (1 represent no loan and 2 for getting loan situation). The GOs or NGOs needs mortgage/grantee (e.g. land) to initiate any loan in Bangladesh and the poor people faced this difficulty to get the loan facility.

Main constraints faced by the settlers:

So far, the research has shown that the PAP has improved the situation of the majority of the settler households. The research has also shown which socio-economic factors determine the extent to which the income situation is improved or not. This study also tries to identify the main problem as faced by the settlers in practicing the PAP program. At the end of the interview every settler was asked to mention the most important constraints they had faced in the PAP. It gives an overview of the mentioned problems and the frequency it was mentioned. Most of the settlers mentioned that they have to face bureaucracy problems at the time of getting their plot/land in bilateral agreements. They have to wait for a long time and go through a long process to get the land rights and it took up to 5 to 6 months or even more than that time. On the other hand, the local forest department people said that they tried their best to process it quickly but due to some official formalities it takes time.

Table: Main constraints faced by the settlers during this program

Rank order	Problems	% of household faced this problem
1	Bureaucracy	92
2	Lack of alternative market facilities or monopoly	87

3	No credit or loan facilities by the GOs or NGOs	86
4	Middle man exploitation during the crop harvesting time	77
5	Market syndicate or market controlling by the few businessman	57
6	Poor road communication	44
7	Lack of healthy seeds or seedlings, pesticide and fertilizers	39
8	Illegal demand by the local Forest Department at the time of bilateral agreements	31

The major part of the settlers mentioned that they do not get loan facilities from any Government Organization (GO) or Non Government Organization (NGO) due to being involved in the PAP program. It seems that the settler does not have any land properties and the institutions have some basic rules to be eligible for loan settlers need to show mortgage/land property. Micro credit system or some sort of easy loaning system may resolve this problem and the settlers saw this as something urgently needed. Like in other parts of Bangladesh, the PAP program also suffers from the market monopoly system. Monopoly is the market condition in which there is no alternative choice to the consumer. That means there is no market competitor or the local people do not have any choice of market freedom. So, the settlers do not have any alternative market facilities or do not have the scope to get benefit from the other the market. The settlers do not do anything in case of product price fall situation and this was a common phenomenon during the pick cropping season. Many settlers claimed that after going to the market they found out that the price of products (like pineapple) falls due to some unreasonable facts or desire of a few businessmen. Some powerful businessmen had controlled the market illegally and the local Government has no strict monitoring system or even any strict rules for controlling the market. The rural poor people were suffering and as their income level relates to this market system, so, the market is an important factor for this PAP program and poverty alleviation strategies. Moreover, there is no post harvest processing industries in that area even in Bangladesh to preserve pineapple, papaya or banana for long time or to export other countries.Beside these problems, settlers had to suffer for transporting their products to the market due to poor rood communication. The settlers whose production area was far away from the market they have face muddy road system and excess cost for carrying their products. So, the road infrastructure and transport facility should play a vital role for increasing the overall income of the settlers. On the other hand, some settlers had faced illegal money demand by the forest department people to initiate this program which was very unusual issue for this program. So, participants may be disheartened if any of the contractual agreements conditions would be violated because of the negligence of Forest Department officials.

8. DISCUSSION:

This fifth chapter describes the results of the study with possible explanations and arguments by the researcher as well as by other scientists. It also includes reflections on the conceptual frame and methodological approaches.

9. REFLECTION OF THE RESULT:

This research showed that the poverty alleviation through Participatory Agroforestry Program in the Sal forest area of Bangladesh can be more effective if the settlers work more closely with the forest department personnel. So far this program alleviated about 64% poverty (overall) of the studied area. The overall poverty for Bangladesh is about 55% and it includes both the urban and the rural population. In rural areas, the overall poverty is very apparent and accounts for more than 80% of the total population And the poverty situation in the remote areas is more severe than that of the developed one. According to the result of this study, the poverty rate in the settlers of the Sal forest area fell from 100% to 36%, as measured by the head count index. On the other hand, to measure the Poverty Gap among the settlers, i.e. how far the 36% poor households are from the poverty line, the result indicted that only 8% settlers were far from the poverty line. In a case study at the Sal forest area of Bangladesh. It was due to the total failure of the PAP production or any unexpected situation that might lose the total production in the current years. The accomplishment and replication of participatory forestry program depends on higher and assured personal economic returns (Jain and Singh, 2000). So, the success of Participatory Agroforestry Program should depend on its economic output (i.e. income). The economic output, i.e. the income of the settler in a similar participatory forestry program has varied due to their socioeconomic factors . Indeed, this study tries to identify the associated factors that might make the income differences among the settlers with the help of linear regression model. The overall result of this model explained that about 72% factors of this variation explained by the four main predictors of this study. The following predictors: months of food sufficiency, family size,

distance to market and institutional loan were the main reasons for the income differences among the settlers. In case of family size, the higher the family member the more the income from this PAP program. The settler who had most of the month's food sufficiency has more income than those who have less months of food sufficiency. Regarding the distance to the market variable, the more the distance of PAP area is the less the income, as the income level of the settlers reduced by the bad road infrastructure and extra traveling costs, etc. The settler who received institutional loan earned more than those who didn't receive loan facilities. So, these four variables were the most important consideration for income differences in this program. To alleviate poverty, these important socioeconomic variables have been taken into special consideration. In a socioeconomic study, he mentioned that the income of the farmers mainly depends on their socioeconomic factors like- education, age, training, gender balance, loan, etc(Papers, 2008). In his study mentioned that cost for distance to market variable was significantly vary the income of the farmers in participatory forestry program in Nepal. Therefore, the socioeconomic parameters of the settlers were the major correlated factors to create the income (i.e. Poverty) difference among the participating members and the model result had significantly proved the hypothesis as well.

The Forest Department and local participants were the responsible elements to initiate this program and their cooperation is the myth of this program. Regarding the constraint of this program, the setters mentioned eight most important problems. The top most constraint was the bureaucracy that has created by the forest department. Proper adoption of this program concept and professional attitude of the forest officials might reduce the bureaucracy problem of this program. The forest department officials need to change monoculture of their mind to a broader appreciation of forestry purposes and to progress for any participatory program(Land & Forest, 2016). That means the forest department officials had to change their negative attitude and to be cooperative with the poor people for successfulness of this participatory program. Hence, to establish participatory forestry program and involving poor people to the forest related activities, the concern policy and policy implemented personnel must be accepted and supported by the local people. Other major problems of this program were: the market system, road infrastructure and loan facilities. These problems need the local government interference immediately. It should be noted here that the only market of this area was controlled by the middleman and the local government do not have any strict control over them. So, strict market resolution and regular monitoring by the local government could improve this worst situation. Moreover, the road infrastructure of this area needs to be improved and regular maintenance by the concern authority with the help of the settlers. Any sorts of microcredit facilities for the settler had directly impact their income level of this program (according to the linear model). The success of this program to alleviate poverty might be a paradigm for any kind of participatory forestry program in Bangladesh.

10. Reflection of the conceptual frame and methodology:

The purpose of this section is to reflect critically on the theoretical aspect of this study and also implication for the findings presented. The concepts were chosen purposefully to guide the case study and maintain a focus during the field work and analyzing the qualitative and quantitative data to answer the research questions. The underlying concepts were helpful in selecting the respondent and the case study. But in the practical field sometimes the concept was not enough to sum up the reality. The concept of poverty and its measurement frame which has been used to quantify the different aspect of poverty was very helpful to conclude the overall poverty of this area. It was very easy to give an overall poverty conclusion with the help of Head Count Index. Hence, FGT index was very critical to explain and relate to this study accurately(Giessen et al., 2016). Finally, the institutional factor was very helpful to give some modifications of this study. In the field, it was very challenging to figure out the institutional constraints like bureaucracy from the poor settlers (due to afraid on govt. institution). Selection of the PAP as a case and three ranges (out of four) of Sal forest area for the study was very helpful to get insight knowledge about this noble program. On the other hand, the 99 households and their cross-sectional data were not so enough to conclude the overall poverty situation of this program. It was better to get more households data in different time scale (i.e. years) to conclude the poverty situation of this area. However, within these three to six months of time it was not possible to get longitudinal data. Finally, the study has given an idea of the present poverty situation among the settlers and it will open the door for further research on similar aspect in the developing countries.

11. CONCLUSION:

In conclusion, Participatory Agroforestry Program in Bangladesh can be an effective strategy for alleviating poverty as well as an income generation activities for the poor people. According to the poverty alleviation aspect, this program alleviated poverty at a significant rate: 64%. Therefore, the present poverty situation of the settler was better than the previous situation, indicating that the participation of rural poor rehabilitating the forest has positive poverty reduction impact on the society. This suggests that there would be social benefits from replicating the Participatory Agroforestry Program in other degraded forest area of Bangladesh(Ali et al., 2008).

However, this is a cross-sectional study and poverty calculation based only on the present year income data of the settlers, so, another longitudinal study will be helpful to conclude overall poverty situation in this region. To address the income differences factors of this study, it might be conclude that the socioeconomic variables such as family size, months of food sufficiency, distance to market and institutional loan of the settlers are the main reasons for the income differences among the settlers. However, these four important variables explained 72% variation of the settlers' income. Regarding the institutional constraints of this program, the study summarized that the following points are the main constraints for poverty alleviation: bureaucracy, market monopoly, no loan facilities and poor road communication. Finally, it would be desirable to make some modifications of this program like to reduce the bureaucracy and implies simple agreements procedure to involve settlers in this program. Modification should also include for ensuring agroforestry training, supplying training manual, ensure loan facilities and better road infrastructure to the settlers. Hence, the local government needs to control the market system strictly so that the settlers get the actual price of their products. So, the people oriented programs like those described here could be a key factor for alleviating poverty and success in Bangladesh. Further it can also encourage other countries that faces similar poverty situation, to follow Bangladesh in this regard.

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